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CONSTRUCTION AND EQUIPMENT

No. 40



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CONSTRUCTION

CONSTRUCTION PROBLEMS REVIEWED LOCALLY

Construction Payment System Examined

Moscow FINANSY SSSR in Russian No 5, May 81 (signed to press 10 Apr 81) pp 32-34

[Article by N. P. Denisenko, deputy administration chief of the Ukrainian Branch Office of USSR Stroybank: "Development of New Forms of Settlement in Capital Construction"]

[Text] One of the most important economic methods whereby the economic mechanism exerts pressure to speed up activation of production capacities and higher efficiency of capital investments is that of settlement for the finished construction product. As socialist society develops, relations improve among enterprises and organizations participating in the investment process, and at the same time there is a need to improve procedures for settlement of accounts between them that will act as an incentive for shortening the duration of the reproductive cycle.

The transition that was made at the right time to settlement for finished projects and phases of construction has helped to identify and to some extent eliminate shortcomings in the planning of capital investments, in furnishing project plans and estimates to construction sites, in organizing supply and transport, and also in relations between general contractors and subcontracting organizations. Increasing the size of the phase of construction has helped in linking them thoroughly to the technology for performance of construction and installation work, and this has in turn improved the quality of plans for organizing construction and the performance of operations. The bank has repeatedly taken specific cases to prove to construction organizations that their financial activity depends directly on the level of organization of the construction process and on thorough prior development of the technology for performing operations on construction projects.

In accordance with Decree No 695, entitled "On Improving Planning and Strengthening the Influence of the Economic Mechanism on Increasing Production Efficiency and Work Quality," the republic's construction organizations were widely converted to settlement of accounts for the marketable construction product. The results of this work as of 1 October 1980 are as follows.

The bank's analysis indicates the favorable influence which conversion to settlement for the marketable construction product has had on the work of organizations operating as construction contractors. For instance, the indicators of Khar'kov Trust No 86 of UkrSSR Minpromstroy (Ministry of Industrial Construction) have improved since the transition. In the first half of 1980 the plan of operations under the general contract was fulfilled at a level of 102 percent, as against 96.2 percent for the corresponding period of 1979, including 101 and 98 percent, respectively, for construction projects scheduled for completion, 173 and 129 for profit, and 103.7 and 103.1 percent for output. The number of projects under construction at the same time dropped from 632 to 593.

In the Kiev Mostostroy Trust No 1 of Mintransstroy (Ministry of Transport Construction) the plan for sales under the general contract for the first half of 1980 was fulfilled at a level of 174.8 percent as against 94.6 percent over the same period of 1979, including 168.6 and 93.7 percent for construction performed with its own resources. The plan for projects scheduled for completion was fulfilled at a level of 122.8 percent as against 101.6 percent, the profit plan at 143.7 as against 104.8 percent, and output rose 2.1 percent.

Indicators of the Conversion to Settlement for the Marketable Construction Product

<u>Name of Ministry or Main Administration</u>	<u>Percentage of Settlement for Marketable Construction Product in Total Volume of Contract Work</u>	<u>For Projects Involving Production Facilities Alone</u>
UkrSSR Mintyazhstroy [Ministry of Construction of Heavy Industry Enterprises]	100	100
UkrSSR Minmontazhspetsstroy [Ministry of Installation and Special Construction Work]	100	100
Glavkiyevgorstroy [Kiev City Main Administration for Construction]	100	100
Mintransstroy	44	43
USSR Minenergo [Ministry of Power and Electrification]	40	42
MPS [Ministry of Railways]	34	39
UkrSSR Minpromstroy	31	15

Much has been done in the republic to expand settlement for aggregate deliveries of materials and manufactured articles and for the rendering of services. Many construction and installation trusts and housing construction combines now receive settlement that way: for example, 14 trusts and housing construction combines in Dnepropetrovskaya Oblast, including the trusts Nikopol'stroy, Krivbassrudstroy and Dneprometallurgstroy. Eight trusts and housing construction combines settle accounts with trucking enterprises for hauling construction materials, manufactured articles and fabrications on the basis of average distances;

and 11 trusts and housing construction combines settle accounts with construction machinery trusts by making payments for the entire set of operations on the project or phase of construction.

Similar forms of settlement have been introduced in Glavl'vovpromstroy, the combine Nikolayevpromstroy, the associations Krymzhelezobeton, Sumzhelezobeton and Kremenchugzhelezobeton and many other construction organizations of UkrSSR Minpromstroy and Mintyazhstroy and Glavkiyevgorstroy. The transition to settlement without intermediate payments has helped to improve the system of material and technical supply to construction and to reduce inventories of building materials and fabrications because of the improved pattern of their delivery.

Settlement for the finished product has been most effective in housing construction combines, where project construction time has been reduced, the cost of construction and installation work has dropped, and targets for profit are being met. Settlement for entirely completed projects, which is practiced by the Dnepropetrovsk Housing Construction Combine of UkrSSR Mintyazhstroy, made it possible to concentrate all physical resources, human energies, financial resources and machines and machinery on projects near completion, which afforded the possibility of reducing construction time and speeding up acceptance for operation. For instance, while standard construction time for large-panel houses is 8-12 months, the actual construction time was reduced to 3 or 4 months. The result was high profitability--23 percent of the estimated cost of the work performed, instead of the 6 percent provided for in the cost estimates. There are many such examples.

Organizations building industrial projects have considerably reduced the volume of construction in process and have increased the relative share of profit in the volume of work accepted by customers. For instance, settlement for the finished construction product in SU-51 [construction administration] of the trust Simferopol'promstroy, which is part of the combine Krymstroy of UkrSSR Minpromstroy, helped to reduce the amount of construction in process. Whereas in 1972 (the base year) its actual figure for construction in process was 211.4 percent of the amount planned, in 1977 it was 89.6 percent and in 1978 it was 40.3 percent. The plan for delivery to customers of operable complexes of enterprises and projects was fulfilled at a level of 100.1 percent in 1977, 103.8 percent in 1978 and 249.1 percent in the first half of 1979.

The main condition for the effective economic and financial activity of organizations operating as construction complexes in the progressive settlement system is detailed planning, correct determination of the planning targets for contract work and the plan for marketed output, as well as for capacities to be put into operation, and the balance between these figures and plans for deliveries of materials and equipment.

At the same time the results of the analysis indicate that shortcomings in planning the indicators of the construction organization, imperfection of economic instruments, and the irregularity of material and technical supply have been adversely affecting the condition of economic and financial activity of construction organizations and accordingly of construction time as well. For instance,

in SU-43 of the trust Sevastopol'stroy of UkrSSR Minpromstroy inadequate and tardy supply of prefabricated reinforced-concrete products, metal, timber and lumber, and also finishing materials resulted in an average construction time that exceeded the standard time by 1 or 2 months.

The failure to meet standard construction times has to do with interruption in the flows of materials and equipment and large losses of work time because of incomplete delivery of equipment to customers and insufficient allocation of funds to meet the standard construction time. For example, the principal causes for failure to fulfill the plan by PMK-99 (mobile mechanized column), Sakhstroy, of the combine Volyn'promstroy, and for late acceptance of projects for operation were these: shortage of manpower, incomplete delivery of equipment to customers at sugar mills undergoing reconstruction, an unsatisfactory supply of construction fabrications and materials by the combine Volyn'promstroy.

The construction time of projects increased at the trust Krasnoluchpromstroy because material resources were scattered over a large number of projects under construction at the same time and located in different rayons of Voroshilovgradskaya Oblast, even though the trust has been entirely converted to settlement for projects and operable complexes on which construction has been completed. The scattering of energies and resources over numerous projects and their distance from the main base resulted in higher construction costs because of changes in the pattern of delivery of materials and higher costs of carrying workers to the projects, as well as higher supplements paid them for traveling time. In 1978 the cost increase resulting from those causes amounted to 43 percent of the total cost increase for the entire trust.

The decree of the CPSU Central Committee and USSR Council of Ministers entitled "On Improving Planning and Strengthening the Influence of the Economic Mechanism on Increasing Production Efficiency and Work Quality" provides for completion in 1981 of the introduction of settlement between customer and contractor for enterprises, operable complexes, phases and facilities on which construction has been entirely completed, which have been accepted for operation and which are prepared for the output of products and rendering of services.

The decree also calls for transition in certain sectors to construction of enterprises (installations) with credit extended by USSR Stroybank to construction and installation organizations operating as contractors to cover the full construction cost of enterprises (installations) as indicated in the estimate accepted by the general contractor, the finished enterprises (installations) to be delivered to the customer on a turnkey basis. In construction of a turnkey project the contractor not only performs the program of construction and installation work, but also handles the orders for equipment, manufactured products and materials issued to the customer. In doing so he checks the completeness of the equipment delivered, handles its acceptance and storage from the moment of arrival at the warehouse until it is turned over to the customer for startup and adjustment work and full-scale tests.

After capacities or projects are accepted for operation and the certificate of the state commission has been approved, the customer makes settlement with the

contractor for the full estimated cost on the basis of the estimate approved and accepted by the contractor for fulfillment. Any saving goes to the contractor. At the same time, if enterprises are put into operation ahead of schedule, 50 percent of its planned profit is credited to the fund of the organization which was the contractor. In spite of the advantages of this type of settlement organizations operating as contractors have not always been willing to take over the functions of customers in buying all the equipment necessary for construction projects.

It would be advisable for Stroybank's institutions to examine these matters with construction contractors and pinpoint specific construction projects to be paid for on a turnkey basis. They should also maintain an ongoing analysis of the performance of construction contractors under the new conditions of economic activity, pass on the experience of the best performers and help those who are lagging. A further improvement of the operation of construction contractors under the new conditions of economic activity will be achieved thereby, and construction time of capacities and projects will be reduced.

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Reducing Construction in Process

Moscow FINANSY SSSR in Russian No 5, May 81 (signed to press 10 Apr 81) pp 34-35

[Article by Y. M. Rodygin]

[Text] The decree of the CPSU Central Committee and USSR Council of Ministers entitled "On Improving Planning and Strengthening the Influence of the Economic Mechanism on Increasing Production Efficiency and Work Quality" includes among the priority measures aimed at increasing the economic efficiency of capital investments reduction of the amount of construction in process to the established allowances. A recommendation has been issued to planning agencies to take steps toward further improvement of the makeup of capital outlays, ensuring an increase in the relative share of outlays for equipment, which presupposes that funds are assigned first of all to reconstruction and retooling of enterprises.

Reconstruction of enterprises, in which 60-70 percent of all outlays go for equipment, is economically more advantageous for the national economy than new enterprise construction. It makes it possible to put new production capacities into operation in a short time or to augment them, to stabilize the level of construction in process and ultimately to increase the economic efficiency of capital investments. This direction in the planning and use of capital investments has been reflected in the capital construction of Tashkent and Tashkentskaya Oblast. Whereas the total increase in the volume of capital investments for industrial construction in 1979 was 50 percent as compared to the same period of the Ninth Five-Year Plan, outlays for reconstruction and retooling of enterprises nearly doubled, and the relative share of outlays for equipment amounted to more than 62 percent.

In the years of the 10th Five-Year Plan there was some improvement in the planning of capital investments, they were concentrated on construction of projects carried over from the previous year and those scheduled for completion in the current year, and at the same time there was a reduction in the number of new construction starts and projects, results to which the effort of institutions of USSR Stroybank in Tashkent and the oblast contributed. In the 1976-1979 period they made proposals which were accepted and carried out by the relevant ministries and departments to increase the planned activation of fixed capital by 82 million rubles at 68 projects, including 19 million at 12 projects, without additional appropriations, to increase the volume of capital investments 51 million rubles at 177 projects near completion, to eliminate 94 projects and parts of projects from plans and title lists, 30 of them new construction starts and 33 of them representing a total annual volume of capital investments of 18 million rubles, on the grounds that construction was inadvisable, project plans and estimates were not available, or construction standards and regulations had not been met. All of this unquestionably helped to increase the economic efficiency of capital investments and to reduce construction in process.

Improvement of the structure of capital investments and of the planning and actual use of funds has made it possible to increase the activation of fixed productive and nonproduction capital. At construction projects of Tashkentskaya Oblast alone 41.6 percent more fixed capital was activated in the 1976-1979 period than over the same period of the Ninth Five-Year Plan. But this did not result in a reduction or even stabilization of the amount of construction in process, since it took place in the context of an actual growth of 59.4 percent in the amount of capital investments. Serious shortcomings in capital construction stand in the way of reducing the volume of construction in process and of increasing the efficiency of capital investments; Comrade L. I. Brezhnev, general secretary of the CPSU Central Committee and chairman of the Presidium of the USSR Supreme Soviet, spoke about them at the November (1979) Plenum of the CPSU Central Committee. The main one is the systematic failure to fulfill targets for activation of capacities and projects and plans for capital investments, which tends to prolong project construction time, to increase the volume of construction in process, to raise the construction cost, and to cause the idleness of sizable funds for lengthy periods of time. In Tashkent and Tashkentskaya Oblast the assignment for activation of fixed capital was met at only 83 percent for the 4 years of the 10th Five-Year Plan, while the plan for capital investments was fulfilled at a level of 94 percent. The shortfall in activation of capital was 792 million rubles and the shortfall in assimilation of capital investments was 262 million rubles. The lowest fulfillment of these targets was in 1979--78.4 percent. As a result the volume of construction in process as of 1 January 1980 had risen to 456 million rubles, or 60 percent over the beginning of the 10th Five-Year Plan.

Systematic failure to fulfill plans and targets has had the result that in Tashkent alone in 1979 there were more than 40 construction projects whose construction had long ago exceeded the standard and even the planned construction time. And engineering documentation gets out of date because of the lengthened construction time of projects. For that reason it is frequently revised during construction, and as a rule the estimated cost of the project increases, and in

most cases this does not involve an increase in the rated production capacities. All this results in an increase in the volume of construction in process. If its volume is to be reduced to the level allowed, everything must be done to speed up activation of fixed capital.

This is a complicated task, and can be performed only if labor, material and financial resources throughout the entire construction complex in the region are concentrated on projects near completion that have been under construction for a long time.

Failure to meet standards for construction time results first of all from shortcomings in organization of the construction process and of project planning. This situation is compounded by improper planning, when plans and title lists assign funds to numerous and secondary construction projects and facilities, which tends to set the estimated cost too low and increases the expected construction time. In 1979 planning faults of this kind were committed by Mianenergo, Minstroy [Ministry of Construction], Minpromstroymaterialy [Ministry of Construction Materials Industry], Minavtotransport [Ministry of Highway Transportation], Minavtodor [Ministry of Highways], Minbyt [Ministry of Consumer Services], Minsvyazi [Ministry of Communications], Minpishcheprom [Ministry of Food Industry], Minlegprom [Ministry of Light Industry], Minkomkhoz [Ministry of Municipal Services and Utilities] in the republic, the associations Uzglavneftesnabsbyt, Uzplodoovoshchvinnprom, Glavtashkentstroy, and local soviets of people's deputies.

Upon discovering cases of violations in the planning of capital investments, Stroybank institutions recommended corrections in plans which were accepted by the relevant ministries and departments and carried out in 1979, as follows: to increase activation of fixed capital at 14 construction sites by 2 million rubles, to increase the volume of capital investments at 16 construction sites near completion by 1 million rubles, to eliminate from plans, title lists of projects and lists of structures within projects 35 complete projects and 21 parts of projects with a total annual volume of capital investments amounting to 4.9 million rubles. Upon analyzing plans for 1980 they also made recommendations for speeding up the activation of fixed capital, for increasing the volume of capital investments at projects carried over from the previous year and scheduled for completion in the current year, and for eliminating dozens of projects and parts of projects where violations of standards and regulations have been found. Most of the recommendations were accepted, and this contributed to a higher level of fulfillment of targets and plans for the year.

Nevertheless, there was a substantial drop in the pace of construction. the delivery of project plans and estimates on projects under construction is tardy and incomplete, industrial enterprises are not receiving full delivery of reinforced-concrete and metal fabrications, parts and basic building materials. In the construction subdivisions of Glavtashkentstroy, Minstroy, and UzSSR Minmontazhspetsstroy [Ministry of Installation and Special Construction Work] and other ministries carrying on construction in Tashkent and in the oblast the work-team method is slow to be introduced though this form of organization considerably increases productivity and workmanship and contributes to acceptance of capacities and projects for operation ahead of schedule or on time.

In certain cases customers are not prompt in clearing space for construction organizations, the allocation of plots of land for upcoming construction is not handled expeditiously enough, and they hold back the clearing of structures and preparation of the shops of existing enterprises for reconstruction. Sometimes when the production areas, foundations, shops and so on are complete, the projects cannot be accepted because delivery of equipment has been late or incomplete. All of these shortcomings in the organization of the construction process, project planning and general planning have resulted in the growth of the volume of construction in process and substantially detract from the economic efficiency of capital investments.

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CONSTRUCTION

PLANS FOR ARMENIAN MACHINEBUILDING DISCUSSED

Yerevan PROMYSHLENNOST' ARMENII in Russian No 3, 1981 (signed to press 6 Apr 81)
pp 2-5

[Article by V. G. Skryabin, deputy USSR minister of Machine Tool and Tool Building Industry]

[Text] Machinebuilding and metal manufacturing (which employ more than 40 percent of the entire industrial labor force directly employed in production) can develop at a high pace only if equipment is applied to production that ensures a substantial rise in labor productivity, if progressive processes are widely applied and if the organization of production is improved.

We need to note the great concern constantly shown for the development of machine tool building in Armenia by the Armenian CP Central Committee and ~~and~~ Council of Ministers.

In the years of the 10th Five-Year Plan the industry's enterprises located in the republic achieved high growth rates of commodity output; the average annual growth rate was 10.4 percent, which is higher than the rates envisaged by the plan.

Production of the most progressive products has also been developing at a fast pace. The output of precision machine tools quadrupled over the 5-year period, while the output of machine tools with ChPU (digital program control) increased 2.5-fold. The output of forge and press equipment nearly doubled and that of automatic forges and presses 64 percent. High growth rates were also achieved for other items in the basic products list. A definite effort was made to raise the technical level and quality of the products produced and also to put new types of equipment into production.

On the whole the plants of the machine tool and tool building industry fulfilled the plan for development of science and technology assigned for the 10th Five-Year Plan. There were also improvements in raising the quality of the products produced. Sizable efforts were made to expand the production plant of the industry's enterprises. Their fixed industrial productive capital and productive capacities increased.

Along with the favorable results in the performance of machine tool and tool building enterprises located in Armenia there were also substantial shortcomings. The most serious are the unsatisfactory quality of manufacturing and the low technical level of products produced by certain plants, which is manifested in the low volume of export deliveries, the low relative share of products in the superior-quality category of certain plants, and the comparatively high figures for complaints and returns for additional work. We should also include among the shortcomings the fact that only a negligible portion of the output of the industry's plants can be classified among the most highly efficient and productive. The products being produced at many plants have not been updated for a long time and their technical level is low.

Particular attention should be paid to the indicator that reflects utilization of fixed capital--the output-capital ratio. This is one of the most important indicators for raising production efficiency. Yet in this year of the 10th Five-Year Plan the output-capital ratio rose only 0.8 percent. There are serious shortcomings in the organization of production and the condition of the workplace, in improvement of the working and living conditions of the workers.

These and other shortcomings are the result of an unsatisfactory effort by certain enterprise directors and also insufficient attention to these matters by the leadership of the ministry's all-union industrial associations.

During the 11th Five-Year Plan there is to be a sharp rise in the productivity of new types of equipment and tools produced in the machine tool and instrument building industry, substantial changes in the composition of output and a considerable increase in the output of highly efficient equipment and tools.

In order to fulfill the target assigned for increasing productivity of equipment as compared to that produced in the 10th Five-Year Plan 1.5-1.6-fold for metal-cutting equipment, 1.4-1.5-fold for forge and press and foundry equipment, 1.2-1.3-fold for woodworking equipment, and also to increase its operating reliability and service life 1.4-1.6-fold, during the period 1981-1985 technical documentation needs to be developed in the ministry as a whole for 1,500 models of equipment, 1,100 items in the adjustment-run stage need to be put into production, and 600-650 outdated types of equipment need to be withdrawn from production.

Equipment with that level of productivity cannot be built through partial modernization of existing designs. Relying on the know-how they have acquired, designers will have to create fundamentally new types of equipment, including types which do not have analogs in world machine tool building.

In the 1981-1985 period plans call for a further sizable increase in the total output of highly productive equipment: more than 40 percent for automatic production lines consisting of machine tools, more than 58 percent for automatic and semiautomatic machine tools in all the process groups, 2.5-fold for machine tools with ChPU, 2.1-fold for automatic forges and presses, 3.3-fold for forges and presses with program control, 80 percent for automatic forge and press production lines, and 92 percent for automatic production lines in foundries.

The production of the most productive types of tools will develop at a faster than average rate: 2.3-fold for tools furnished with multifaced throwaway tips, 9.2-fold with tips covered with wear-resistant coatings, twofold with cutting edges consisting of semicrystalline diamonds, boron nitride and other ultrahard material, and 3.2-fold for tools for machine tools with ChPU and automatic lines.

The staffs of machine tool building enterprises in Armenia therefore face new and more complicated tasks in achieving a growth in the volume of output of products, in improving the composition of output, in putting new technology into production, in retooling and consequently raising the technical level and efficiency of production.

For the ArSSR machine tool and tool building industry as a whole the volume of production is to increase in the 11th Five-Year Plan by 56 percent, the output of special machine tools 39 percent and the output of machine tools with ChPU 87 percent.

A reduction in the total output of machine tools with manual control is planned, which will make it possible to increase the output of special and precision machine tools and machine tools with digital program control.

The growth of output of tools planned for the 5-year period will be achieved mainly without increasing material resources, by improving the design of tools and by introducing low-waste processes for manufacturing them, as well as by optimizing the composition of output.

Those same factors will also determine the production of diamond tools.

Plans call for an increase in the volume of output, an expanded list and higher quality of durable consumer goods and housewares.

We will dwell briefly on those basic tasks faced by particular enterprises in Armenia's machine tool and tool building industry.

The Charentsevan Machine Tool Plant faces a very complicated and crucial task during the 11th Five-Year Plan of entirely updating the list of the products it produces and of organizing series production of boring-and-facing-and-milling machines and heavy horizontal boring machines with ChPU. The plans call for increasing the output of machine tools with ChPU to 29 percent and that of special machine tools to 18 percent of total output. In order to perform this task the plant will have to activate fully newly added production capacities, augment the capacities of its affiliates and use them for the principal production effort, retool enterprises and, most important, raise the organization of production and the workplace environment to the level of the new equipment which the plant will be producing in the new 5-year period.

At the Kirovakan Precision Machine Tool Plant plans call for increasing the output of high precision machine tools, special machine tools and machine tools with ChPU. New models of an electric-erosion engraving machine with ChPU are to be put into production; this machine has broader processing capabilities and a

high degree of automation, which raises labor productivity 1.9-2-fold. The plant is to conduct important efforts to improve the workplace environment and working conditions.

The Yerevan Production Association, which consists of the Yerevan Machine Tool Plant imeni Dzerzhinskiy and the October Machine Tool Plant, is to make the transition to the output of new models of lathes and radial drill presses in the 11th Five-Year Plan.

The Yerevan Machine Tool Plant imeni Dzerzhinskiy is to put machine tools with ChPU into production and to bring their output up to 300 units per year. It will increase the number of special and specialized machine tools and machine tools with attachments. The series-manufactured lathe (Model DM61), which is in production at the present time, must be withdrawn from production and be replaced by a new model in the single standardized line of lathes. In its technical parameters and design the new lathe will meet present-day requirements, and the task of the plant's work force is to see that in its quality of manufacture the machine comes up to the figures contained in the design. The plant must also organize the production of new models of semiautomatic center drilling and center-drilling-and-trimming machines.

The Yerevan Milling Machine Plant is to make the transition to manufacturing a new model of general-purpose milling machine and to considerably elaborate the list of equipment produced by reducing the output of machine tools with manual control and increasing the production of automatic machine tools and machine tools equipped with an operational ChPU system. In that connection the plant is to perform equally complex organizational tasks to sharply increase the workplace environment, discipline and responsibility for quality performance of each manufacturing operation and the product as a whole.

Particular attention must be paid to the Leninakan Grinder Plant.

For a lengthy period the plant has operated unsatisfactorily, the production plan has not been fulfilled, and the quality of the machine tools and forge and press machines it has been manufacturing has been low. The situation has improved recently, but there is no reason to be complacent.

During the 11th Five-Year Plan the plant is to update the list of its products and to put into production new models of cylinder-and-cone grinding machines which have improved and high precision. Performance of these tasks will make it possible to move the Leninakan Machine Tool Plant to the front ranks in terms of the technical level of the products it produces.

In order to save on high-speed steel the Charentsevan Tool Association must organize the production of slot and flat broaches with inserted elements of hardened high-speed steel, to master waste-free cutting of workpieces on presses and power shears, and to organize the industrial production of welded broach designs.

The Yerevan Production Association for the Manufacture of Processing Jigs, Tools and Fixtures underwent considerable development in the 10th Five-Year Plan. A large production building was erected at the main plant, and the task is to bring it up to rated capacity in a rapid and reasonable way.

The other enterprises of Armenia's machine tool and tool building industry also face large and crucial tasks.

In the light of the new tasks the scientific-production association Armtanok, which is to become the scientific-experimental and mechanical and process engineering center of the republic's machine tool building industry, will have a considerably larger role and responsibility. The NPO (scientific-production association) Armtanok qualifies for this function in all respects (space, equipment, and competent scientists and engineers), and what need to be added are desire and persistence and above all responsibility for the technical level of the industry's enterprises within the republic.

At the November (1979) Plenum of the CPSU Central Committee Comrade L. I. Brezhnev criticised machine tool building because of unjustifiably high metal intensiveness of many machines and pieces of equipment manufactured in the country.

An analysis conducted in 1978 of the metal intensiveness of 143 models of machine tools and forge and press machines showed that about 25 percent of them were heavier than they should be. And though a certain effort was made in the 1978-1979 period to correct the high metal intensiveness, the potential for reducing the weight of machines has by no means been exhausted.

The coefficient of utilization of rolled products of ferrous metals at Armenia's enterprises is 0.55, which is below the average for Minstankoprom (Ministry of Machine Tool and Tool Building Industry) (0.6).

The plants did not fulfill the assignment for reduction of rates of consumption of rolled metal products in 1979 as a whole. Nor were the conservation targets assigned met by seven enterprises, including the Yerevan Milling Machine Plant, the Charentsevan Tool Plant, and the Leninakan Grinder Plant.

At Gidroprivod, a pilot plant in Yerevan, the coefficient of utilization of rolled products of ferrous metals is the lowest in the republic.

Nor was the target for metal conservation fulfilled.

In the 10th Five-Year Plan the average reduction of rates of consumption of rolled products of ferrous metals was set at 20 percent at the ministry's enterprises in Armenian SSR. The coefficient of utilization of rolled products of ferrous metals is to rise from 0.55 in 1980 to 0.65-0.80 in 1985.

The tasks which have been set require a considerable intensification of efforts to conserve on physical resources and to carry out a strict regime for saving on materials. Particular attention should be paid to the introduction of progressive technology in shops which prepare workpieces; to be specific, the relative

share of stamped workpieces is to be brought up from 37 percent of the total volume of forgings from rolled products in 1980 to 60 percent in 1985.

A number of new manufacturing processes are to be introduced at the industry's enterprises in Armenian SSR during the 11th Five-Year Plan to obtain optimum and economical workpieces for manufacture of parts of machine tools and tools.

There are also plans to considerably increase the use of machine tool parts of polymer materials at the industry's enterprises. Centralized production is being organized for this purpose.

In the 11th Five-Year Plan there will be a considerable increase in the need for iron castings. The capacities of the Charentsevan Tsentrrolit Plant must be augmented so as to entirely meet the need of all the plants of Armenia and eliminate the bringing in of castings from other regions of the country. In order to meet the need for castings of nonferrous metals there are plans to expand that production at Tsentrrolit.

One of the decisive conditions for successful fulfillment of the program of the 11th Five-Year Plan is to improve the operation of design and scientific research organizations. There is a need as well to augment the role and responsibility of designers for the technical level and quality of the machines they create. There is a need for reexamination and radical alteration of the present practice of organizing the entire technological preparation of production in which the operations of design, process development, manufacture of prototype jigs and fixtures and special tools occur consecutively, though many of them should be done concurrently.

Present-day creation of up-to-date designs of machine tools and other machines requires a knowledge of the specific features of the most recent control and electronic systems. At present groups of the relevant specialists have been created only in certain design organizations (and even there they are small).

Raising the technical level and quality of the product is inseparably bound up with performance of measures to perfect production technology and the organization of production within the machine tool industry itself. The need to introduce progressive manufacturing processes results from the fact that the volume of production must be augmented at existing plants without increasing the size of the work force. All the enterprises face the task of reducing the number of workers engaged at manual labor. This necessitates more vigorous measures to retool enterprises, to furnish them progressive equipment, and to introduce low-waste processes. These measures are being drafted at the present time, and specialists of the plant themselves must be recruited as widely as possible to participate in this effort. Particular attention should be paid to broad application of machine tools with digital program control and to introducing progressive processes and equipment in forge and press shops and foundries.

At Armenian plants of Minstankoprom 160,000 square meters of floor space in production and auxiliary buildings is to be built and put into operation over the entire 11th Five-Year Plan.

In the 10th and 11th Five-Year Plans the production work space of the machine tool and tool building industry in Armenia should more than double. There is actually not a single enterprise which will not undergo reconstruction and expansion. Sizable funds will be spent for retooling.

This kind of dynamic growth of the industry's industrial potential will create the conditions necessary for a solid rise in the technical level and quality of the products produced and for successful fulfillment of the program for development of the machine tool and tool building industry which has been outlined by the party and government.

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CONSTRUCTION

SYSTEM OF WORKING OUT, APPROVING TITLE LISTS ANALYZED

Moscow PLANOVYE KHOZYAYSTVO in Russian No 6, Jun 81 (signed to press 7 May 81)
pp 122-123

[Article by M. Sidorov: "Give More Attention to Working Out and Approving Title Lists for Construction Projects"]

[Text] During the Tenth Five-Year Plan capital investments in the national economy totaled 635 billion rubles. More than 1,200 large industrial enterprises were put into use. The fixed production assets of the country at the end of 1980 exceeded 1.1 trillion rubles.

At the same time there are substantial deficiencies in capital construction. Construction ministries, client ministries, and union republic councils of ministers are permitting an overextension of resources at a multitude of structures instead of assigning them to the most important structures, especially installations that are about to start operating. The volume of incomplete construction is substantial, the timeframes for building industrial structures and putting them into operation are lengthening and the number of carryover construction projects is great.

One of the reasons for the overextension of capital investments is, in our view, the existing system of working out and approving title lists of construction projects intended for industrial use. Since 1968 title lists of newly begun construction projects are worked out for the entire construction period—up until they are fully completed and put into operation. When this is done, naturally, much of the clients' and contractors' time is lost in agreeing to the projects in the title lists. In actuality they are only in force and financed by USSR Stroybank [Construction Bank] and USSR Gosbank for the first year and starting with the second year new construction projects are counted in the category of carryover construction projects and subject to being included in the title lists for the planned year.

During the 9th and 10th Five-Year Plans USSR Gosplan made an attempt to adopt five-year title lists for carryover construction projects (with tasks broken down by years) to coordinate the volumes of work with the production capacities of construction and installation organizations. Financing was accomplished and plans were drawn up for contract work only during the first year after they were approved (during the 9th Five-Year Plan in 1972 and during the 10th Five-Year Plan in 1977). Then title lists of carryover construction projects had to be worked out and approved anew every year.

Now a new construction project is considered to be erection of a new building or installation at an operating enterprise if it had not been carried on during the previous year, along with the construction of a new enterprise or a branch of it at a separate site in the same city or another one. For such "new construction projects" title lists are also worked out and approved for the entire period of construction but they are only in force for the first year. Therefore, as it seems to us, instead of dividing all construction projects intended for industrial use into new and carry-over projects when working out capital construction plans it is necessary to divide them into especially important, large and construction work below the limits.

Especially important construction projects are those that determine the systematic and proportional development of the national economy, individual sectors and economic rayons. They require that five-year title lists be worked out which include new and carryover construction projects in them with tasks divided among the years of the five-year plan. The erection of large new enterprises and the reconstruction and expansion of existing enterprises, building roads (rail and motor vehicle), airports, gas and petroleum pipelines, large power stations, high voltage electric lines that extend for a great distance, agroindustrial complexes, etc. need to be grouped with especially important construction projects. Title lists of especially important construction projects in the five-year plan are subject to approval by the USSR Council of Ministers as part of the five-year state plan for the economic and social development of the USSR. The programs in these title lists for putting production capacities into operation must remain unchanged during the years of the five-year plan while all the remaining indices for each construction project can change in accordance with the results of fulfilling the annual plan for capital construction.

Large construction projects are those projects that have an estimated cost of 10 million rubles or more (25 million rubles for sectors of heavy industry), for those that are newly begun and those that are carried over (including the reconstruction and expansion of operating enterprises) which make it possible to eliminate the imbalance in the development of certain sectors of the national economy and economic rayons. It is also necessary to work out five-year title lists for concentrating capital investments on these construction projects. Client ministries should approve them after coordinating them with USSR Gosplan. The tasks for putting production capacities into operation in these title lists also must remain unchanged over the years of the five-year plan while changing the remaining indices every year in accordance with the results of fulfilling the capital construction plan.

Construction projects that are below the limit are projects with an estimated cost of less than 10 million rubles (lower than 25 million rubles for sectors of heavy industry). It is expedient to work out, not five-year, but yearly title lists for them and that approval be granted by the client ministries in February-March of the planned year without coordinating them with USSR Gosplan. This will make it possible for client ministries to quickly eliminate tight spots in production and technically retool them.

The lists of newly begun construction projects and also the lists of operating enterprises that are scheduled for reconstruction and expansion, with their primary technical and economic indices indicated, will have great importance for improving the quality of title lists. Beginning with the 11th Five-Year Plan client ministries will draw up such lists in implementing the CPSU Central Committee and USSR Council of Ministers decree concerning an improvement in the economic mechanism.

In ensuring the successful realization of the title lists, and most of all for the especially important construction projects, a requirement in the decree refers to the fact that the approved title lists must be unchangeable planning documents for the entire period of construction that are obligatory for clients, contractors, planning, financing, banking and supply agencies, and suppliers of equipment and structural components. Changes in the indices of the title lists of construction projects may be inserted only with a review of the projects in connection with the adoption of more improved equipment and advanced technology.

Along with the change in working out and approving title lists of construction projects that are intended for industrial use it is expedient, in our view, to regulate the practice of planning the reconstruction and expansion of operating enterprises.

As is well known, general reconstruction and expansion of operating enterprises requires that a TEO (expansion unknown) and technical (technical-working) designs be drawn up, coordinated and approved. And since this is an extremely laborious and troublesome matter for planners and client ministries they attempt to work out designs and estimates for each structure individually. Such an attempt, along with other reasons, has caused a substantial increase in the number of structures that are being built at the same time at operating enterprises.

In addition, the economic effectiveness of capital investments, when reconstructing and expanding according to designs and estimates for individual structures, is lower by far than when using an overall technical (technical-working) design. Therefore, it seems expedient, for example, to work out an overall technical (technical-working) design when the estimated cost of constructing new buildings at an operating enterprise is 10 million rubles or more (25 million rubles or more at enterprises in sectors of heavy industry).

When dividing the planning and building of enterprises and structures into phases the client ministries are governed by the Instructions for Working Out Designs and Estimates for Industrial Construction which were approved by USSR Gosstroy in 1976. In accordance with them the construction of large and complex enterprises and structures must be planned in phases whose duration, according to the standards, does not exceed three to four years, as a rule. In practice the planning and construction of large and complex enterprises and structures are often divided, not in large phases as it says in the instructions, but in small ones. Along with this clients often divide the erection of buildings into phases and not just large and complex ones but average size and small ones as well, which is also a violation of the instructions. This is done with the aim of making capital investments cover the construction of as many new structures as possible although it is with meager resources.

It seems that for increasing the effectiveness of capital investments it is expedient to add a statement to the instructions that planning and construction of large and complex enterprises and structures may be divided into phases only with a standard duration of construction of six to eight years and only in two phases of two to three years each while individual buildings be erected without dividing them into phases.

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CONSTRUCTION

FIRST QUARTER RESULTS OF CONSTRUCTION IN NECHERNOZEM REVIEWED

Moscow STROITEL'NAYA GAZETA in Russian 29 Apr 81 p 2

[Article: "Compensate For What Has Been Neglected"]

[Text]

Contract Ministries	Arrears Since the Beginning of Construction (in mill. rubles)	Plan for 1981 (in mill. rubles)	Portion of Plan Completed (Percent)	
			For 1st Quarter	For Year
USSR Ministry of Power and Electrification	0.1	1.0	96	21
USSR Ministry of Construction of Heavy Industry Enterprises	11.4	12.26	116	19
USSR Ministry of Industrial Construction	7.8	11.8	84	15
USSR Ministry of Construction	19.94	18.8	100	15
USSR Ministry of Land Reclamation and Water Resources	16.87	3.19	75	10

In the previous review published 30 Jan 1981 ("The Words and Deeds of Associated Workers") the results of the work of contract ministries in 1980 were analyzed. It was noted that many collectives, while developing competition according to the principle of a "workers' race", were able to put planned capacities into operation on time. The affairs of the USSR Ministry of Construction of Heavy Industry Enterprises and the USSR Ministry of Installation and Special Construction Work were noticeably corrected. However, not all of the complexes in the Main Nechernozem Construction Administration's building industry, which should have been completed during the course of the 10th Five-Year Plan, turned out industrial products.

In the recently published CPSU Central Committee and USSR Council of Ministers Decree "Concerning the Further Development and Improvement of Agricultural Efficiency in the Nechernozem Zone of the RSFSR During the Years of 1981 to 1985" the specific tasks of the ministries and departments in forming the agricultural building industry

were determined. It is important to point out in connection with this that the approach to planning the construction of important installations in the Nekhernozem industrial base has changed. The required capital investments and resources that will make it possible to speed up the pace of work are being allocated to the construction projects that have already been started. Measures are being taken in order to overcome the lag in building housing for the operators.

The results of the first quarter testify to the fact that builders, installers, planners, equipment suppliers, and clients have set about implementing the resolutions of the 26th CPSU Congress for reorganizing the Nekhernozem with much responsibility. Associated workers have met the goal for three months and the volumes of work at complexes that are about to start up have increased substantially in comparison with the corresponding period of last year. For example, the plan for erecting a woodworking and ZhBI [reinforced concrete components] plant in Komi ASSR and a large panel housing construction plant in Vologda was fulfilled by almost a factor of 1.5. Local subdivisions of the Ministry of Construction of Heavy Industry Enterprises in close collaboration with associated workers drew up a tight schedule which specified that installations be put into operation at the end of October rather than in December. And the obligations were reinforced by a "workers' race" agreement.

Participants in the construction of the Shilovo land reclamation base in Ryazanskaya Oblast are working at the greatest possible speed. Under the supervision of the Oblast party headquarters (Director S. Shiryayev) a genuine atmosphere of mutual assistance, efficiency and purposefulness toward the end result was maintained at the construction site. Despite the complexity of the delivery of materials and structural components each of the 37 partners fulfilled their obligations exactly on schedule. And it was no accident that unprecedented rates were achieved at the KPD [large panel housing construction] starting plant and for the production of porous clay filler gravel and that living space in the village for the land reclamation specialists was put into use at an accelerated pace.

Where associated workers changed from mutual claims against each other to specific assistance for each other there are no reductions. Worker initiative is finding support in USSR Gosnab and in the system of contractor ministries. Operative control over the pace of work has been established in the USSR Ministry of Construction of Heavy Industry Enterprises and the USSR Ministry of Industrial Construction. But the seniority tendencies, especially in organizing the delivery of supplies based on cooperation, make themselves felt. Thus, a land reclamation base in Kuluzhskaya Oblast is experiencing a shortage of prefabricated structural components. And the Main Priokskiy Construction Administration, which turns them out in neighboring Tul'skaya Oblast, is not equipping products with all the parts that are needed and as a result of this, it is impossible to assemble the ZhBI plant's framework. There is also a similar situation in Sverdlovskaya Oblast: the Main Central Urals Construction Administration, having started the Rezh Heavy Construction Trust as the land reclamation base general contractor, is not responsible for supplying the parts from its enterprises.

Both construction sites--in Kaluzhskaya and in Sverdlovskaya oblast--are experiencing identical difficulties. Recently formed subdivisions that have not been completely provided with either technology or an industrial base are erecting them. The

difficult situation is also aggravated by the lack of an available housing supply. As a result, up to the present time general contractors have only been able to recruit half of the regular need for construction workers and both are suffering from turnover in personnel. It is obvious that the Ministry of Industrial Construction and the Ministry of Construction of Heavy Industry Enterprises in collaboration with the Main Nchernozem Construction Administration need to solve this problem.

Developing villages in the Nchernozem is a multifaceted and all encompassing process. It is equally important to give comfortable apartments to construction workers, land reclamation specialists and workers in the construction industry as to agriculturists, livestock breeders and other specialists. The pace of transforming a region depends on this to an equal degree. But in order to carry on the reconstruction of villages an industrial housing construction base is needed.

Unfortunately, this work is evidently dragging on. In particular, the USSR Ministry of Construction is still hardly considering the needs of the client. As the general contractors of 8 of 16 land reclamation bases, its subdivisions in essence have not put a single large industrial capacity into operation over the course of four years. The current position of the ministry seems more than strange: out of the ZhBI plants about to start operations with an annual production of almost a half million cubic meters of products the start up of operations for "truncated" shops with 40,000 cubic meters were included in the plan. When will the program be resolved--in 10 years?

We read in the report signed by the USSR Ministry of Construction: "to take necessary measures to complete the work on the installations that were turned over in 1980." It is, without a doubt, not bad that it was decided to eliminate past defects in a short period of time. But it is not permissible to relax our attention on the long term ones as well. The structures of the associated enterprises in Kaliningrad, Novgorod, Smolensk, Kirov, that is, in rayons that are unfavorable from the point of view of the construction industry base, have hardly been begun. This is happening because 300,000 rubles, on the average, are being included in the plan with an estimated cost for a complex at 20 million--but even this is not being completed.

A similar general contractor's option is dampening the ardor of associated workers and undermining the authority of the "workers' race." Let's take the Kostroma base. Directors from Kuybyshevskaya Oblast erected a complex of enterprises here from imported materials. But the start up is being delayed. Why? There is no heat, power or water. The Kostroma TUS [Telephone Communication Center] began to hook them up to the construction site four years ago. They built water mains the first year, communication lines the second, then heating lines and a power network. And when the long awaited utility lines should have been put into operation it was discovered that during the process of earth work each subsequent executor destroyed the work of the preceding one. This is what it means to break down a year and a half's volume of work into four years.

In light of the previously mentioned CPSU Central Committee and USSR Council of Ministers decree the necessity of heightening the demand for realistic and balanced plans for contract work in the Nchernozem has become crucial. It is impossible to tolerate any longer the fact that half of the largest complexes of the construction industry in the region will in no way be transferred from the category of long-term construction to the number of those that are about to start up while the products that were planned to be manufactured at them must be transported from all corners of the country.

This is even more crucial since the scale of patronage for construction sites in the Nechernozem will expand during the 11th Five-Year Plan and the demand for modern materials, structural components and completely prefabricated houses will increase. It is necessary to apply efforts for the unconditional start up of KPD enterprises in Kostroma, Ryazan' and Vologda. There are also realistic possibilities for putting the Ivanovo land reclamation base into operation that directors from Uzbekistan are erecting.

A fairly good start is being made during the first year of the 11th Five-Year Plan. Now the lag of past years should be energetically overcome and the debt to land reclamation specialists completely paid back. Party, soviet, administrative and trade union agencies at the locations are called upon to strengthen control over filling the Nechernozem orders, to achieve an improvement in the effectiveness of labor cooperation between the participants in the "workers' race," and to extensively adopt the advanced expertise of rapidly forming a construction industry base.

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METALWORKING EQUIPMENT

NEW METHOD PROPOSED FOR CALCULATING CAPACITY UTILIZATION OF MACHINEBUILDING PLANTS

Moscow PLANOVYE KHOZYAYSTVO in Russian No 6, Jun 81 (signed to press 7 May 81)
pp 52-61

[Article by Ye. Prigozhin: "Production Capacity and the Intensiveness of Machine Building Plans"]

[Text] The 12 July 1979 decree of the CPSU Central Committee and the USSR Council of Ministers "On Improving Planning and Strengthening the Influence of the Economic Mechanism on Increasing Production Effectiveness and Work Quality" outlined a system of measures for improving planning, for making management more democratic, and for amplifying the role of economic levers and stimuli. The planning work of associations and enterprises is aimed at the elimination of factors that lower plan targets, factors that give rise to unwarranted adjustments to plan targets, and factors that generate unduly high appraisals of their overfulfillment. The performance of the enterprise must primarily be evaluated on the basis of the tautness of its plan and its maximum utilization of reserves.

Given the broad development of direct long-term economic relations, success depends not so much on the coordination of the enterprise's relations with the aid of the production-dispatching apparatus [proizvodstvenno-dispetcherskiy apparat] as on the purposeful invocation of economic sanctions against violators of plan discipline and economic discipline and the stimulation of enterprises that meet their commitments to the state and to their customers.

USSR Gosplan has recommended guidelines for determining the tautness of plans. According to these guidelines, a plan is considered to be taut if it ensures the fulfillment of the established targets and the rational use of production capacities plus the expenditure of material, labor and financial resources at the normative level. At the same time, the degree of tautness must be evaluated on the basis of the leading indicators. It is assumed that the latter are defined by branch particulars and by the character of production at enterprises. In all instances, an important place is assigned to the substantiation of the normative level of utilization of the leading production resource.

It is not feasible to include in the definition of tautness the entire list of characteristics of various aspects of the effectiveness of production (including the lowering of the materials-output ratio, the fixed capital to output ratio, the investment-output ratio, the enterprise cost of production [sebestoimost' produktsii], the improvement of product quality, and higher profits) even though the significance of each of them is very important for evaluating the effectiveness of production. The extremely large number of criteria for evaluating the plan has always prevented collectives from concentrating their efforts in the main direction.

The economic sense of introducing the tautness concept is to improve planning on the basis of a new normative principle requiring mathematical calculation. For most enterprises, especially in the machine building branch, the utilization of normative production capacity and the level of labor productivity are the basic indicators used in evaluating the tautness of the plan. The leading role of production capacity in production planning advances the task of improving existing guidelines for the calculation of tautness. For example, it cannot be considered proper to determine average annual production capacity by adding (subtracting) the average quantity of capacities activated and retired in a year's time without any manner of normative computational base. Guidelines on ad hoc inventories and on the compilation of balances of production capacities that do not take intensive growth factors into account are also imperfect.

Investigation of enterprise capacity is a problem of great theoretical and practical importance in strengthening the planning of the effectiveness of production. Production capacity becomes the point of departure in determining enterprise potential, in substantiating the technical retooling of production, in increasing the tautness of plan targets and of the output-capital ratio.

Practice shows that the economy suffers an annual shortfall of many billions of rubles worth of products due to the underutilization of production capacities. The primary explanation for this is the underestimation of the role of the given indicator in the substantiation of plan targets. A number of machine building branches treat calculations of production capacity as a matter of secondary importance. Standard and branch methods for elaborating 5-year plans and the enterprise's technical, industrial and financial plans (Form 04-TP) make provision only for the evaluation of their use. Moreover, without the proper analysis of the use of existing capacities, an increase in these capacities is usually equated with the planned increase in the volume of production. In turn, the latter is not sufficiently coordinated with the necessary financial and other resources or with limits on equipment. The monitoring and analysis of annual balances of utilization of production capacities are not systematic.

At enterprises and in associations, the main thing is to develop existing capacities on the basis of all-round mechanization and automation, the broad and complete utilization of progressive equipment and technologies, the better organization of production, the introduction of automated control systems, etc. Technical retooling and reconstruction of existing enterprises, including the expansion of production through the introduction of new capacities, are aimed at the integrated development of production, at increasing the general potential of the enterprise to increase its output volume and to secure the more complete satisfaction of the economy's requirement for this output.

It seems expedient to establish the plan for the development of production capacities (as the basis for planning the volume of production) as a separate part of the 5-year plan and the enterprise's technical, industrial and financial plan. It would include plans for the introduction of progressive equipment and technology, mechanization and automation; for the improvement of a system for the management, planning and organization of labor; for the modernization and replacement of obsolete equipment; for rigging and tools; for capital repair; and for the effective use of fixed capital.

Among the various aspects of the theory of effectiveness of production capacities, a significant place is occupied by methodological questions regarding the calculation and analysis of their use and the unity of technical and economic indicators reflecting the return on the production apparatus. There are large discrepancies in the evaluation of one and the same effect by a group of indicators. This point is confirmed by the example of indicators of the utilization of production capacities and the coefficient of shift operation of equipment, the output-capital ratio, the recoupmont of capital investments in new equipment, etc. Each of them expresses quantitative and qualitative changes in fixed capital proper and technical and economic characteristics of their utilization. At the same time, all of them are not methodologically coordinated with one another and are applied in virtual isolation from one another.

Among the shortcomings in the instructions on the determination of production capacities, we should list the imperfection of the methodological approach to the selection of the primary production facility, shop or unit. According to the instructions, the primary production entity is considered to be the one that performs basic technological operations, that concentrates the major part of the equipment, or that expends most of the aggregate labor. Thus it becomes possible to equate the capacity of the entire equipment inventory with the capacity of an individual group of machine tools or even units. With regard to the utilization of the rest of the equipment, instructions are issued to raise their capacity to the level of the primary link with due regard to the elimination of bottlenecks thereby ensuring the equal utilization of all machine tools. Such a formulation is contradictory because the very demand for the equalisation of capacities in all groups of equipment excludes the need to choose a primary link. What is more, the authorization of enterprises to make such a choice without regard to the progressiveness of the production equipment resulted in the distortion of accounting data on the size of enterprises' production capacities. In practice, the leading place has frequently been occupied by calculations for groups of homogeneous general purpose machine tools or machines that limited the capacity of the entire equipment inventory at the beginning of the plan period even though their increase did not require significant capital investments. At the same time, more productive and costly equipment, e. g., specialized units, machine tools with ChPU (numerical program control), automatic and semiautomatic machine tools and lines have been underutilized. At a number of machine building enterprises that have a relatively high percentage of automatic and semiautomatic equipment (over 15-20%), production capacity for many years has been reckoned on the basis of the small group of engine lathes (less than 10 percent) or milling machines (less than 5 percent) in basic production, which cannot be deemed normal in selecting the primary equipment group. Given such an approach to the evaluation of capacity, it is not surprising that some plants operate ChPU machine tools in but one shift. The right to choose the mechanism used to calculate and control fixed capital makes it possible to gloss over the deficient utilisation of the machine tool inventory and capacities.

It is very difficult to secure the proportional utilization of equipment at machine building enterprises. Given the constantly expanding mix, the great diversity of production operations and of the types of equipment in use, it is practically impossible to time the operation of the entire machine tool inventory proportionally with respect to technical capacity and certain other parameters. This is explained by the great differences that exist in the labor-intensiveness of machining the pieces that go into various products and by the varying share of the given products in the structure of the production program.

In view of the changes that have taken place in the material-technical base of production and the trend toward the proportional utilization of individual groups of equipment, we believe that the selection of the primary link (vybor vedushchego avona) should be excluded from the methods used in the calculation of capacities. It appears feasible to replace it by the grouping of production (tekhnologicheskoye) equipment according to its production process: basic production equipment which is used to perform full-scale production, and auxiliary, operational equipment. While it is impossible to organize the production process without auxiliary equipment, the specifics of its use is such that it cannot be fully utilized on a par with the basic equipment group. As a rule, the auxiliary equipment group (which is not effectively utilized in terms of time) comprises a small percentage of the total value of the active part of fixed capital. What is more, auxiliary and operational equipment does not resolve the problem of increasing the utilization of production capacities. Therefore it would be rational to incorporate in the instructions used to calculate enterprise capacities a list of basic production equipment that should be used as the basis for calculating normative production capacity, the normative shift coefficient (koefitsiyent smennosti), and auxiliary equipment.

Cost should be one of the factors considered as the basis for including machines in such lists. In our opinion, the basic equipment list should not include machines costing less than 1,000 rubles. The calculation of the normative shift coefficient for basic equipment should be based on the operation of this equipment in two shifts. In the case of auxiliary and operational machine tools, we should either introduce correction factors or calculate their shift coefficient on the basis of planned utilization.

The correct choice of the unit of measurement is another important condition to the calculation of capacity. Economic theory most often recommends that capacity be measured on the basis of the value of the product measured in physical terms. This has been the basis for the textbook definition of production capacity as the maximum output of the specified product mix per unit of time with the full utilization of equipment and space. The calculation of production capacity has thus been made dependent on the production program. Any change in the planned product mix leads to changes in the magnitude of production capacity. Moreover, it may be entirely impossible to determine the capacity of an enterprise and its subdivisions before the production program is formulated. Such a dependence cannot be deemed correct nor can the method of computation be considered perfect.

The experience of the Moscow "Manometr" Instrument Making Plant and many other machine building plants shows that work on the production plan is inseparable from its coordination with the capacity of all groups of equipment. All drafts of the annual production program, which specifies output volume and product mix, are compared with the capacity of all groups of production equipment including conveyors and production flow lines. The coordination of the plan target with capacity takes into account machine time, the labor-intensiveness of given operations, and the existing output norm. Thus, for the purpose of planning a vast product mix, capacity has always been measured on the basis of labor-intensiveness and not on the basis of value and physical indicators.

There is hardly any basis for the fear that the product mix calculation will be made without regard to the calculation of production capacity. The product mix of

every enterprise forms over a period of years. Depending on the nature of its product, each enterprise is assigned a specific place in the national economic plan and in satisfying society's needs.

In order to decide on ways of improving the methods used in the calculation of production capacity, we must first ascertain the objective and criteria of this calculation and then proceed to evaluate it.

If the calculation of production capacity is primarily intended to help the enterprise proper to formulate its production plan, the task of branch methods (otnashivaya metodika) used in its calculation is to render methodic assistance to the economic services of enterprises in making such calculations on a scientific and theoretical level. The enterprises will then be interested in obtaining realistic data on their production potential and on ways of developing their production capacities further. The accuracy of this information will enable them to adopt taut annual counterplans geared to the maximum utilization of their production capacities. Therefore, calculations of capacities and the level of their utilization must be based on the normative utilization of the basic groups of equipment and production links. This will make it possible to obtain scientifically substantiated data on the capacities of the various subdivisions and the enterprise as a whole and to bring the description of capacity and the shift coefficient of equipment operation closer together. The productivity of technical complexes and their ability to perform an optimum volume of work in standard machine-hours per unit of time (year) become the criterion of formation of normative capacity. Such a methodological approach to the determination of capacity precludes the establishment of production plans below production potential.

The Basic Directions of Economic and Social Development of the USSR in 1981-1985 and the Period up to 1990 stress the demand to combat slackness in plans and to prevent unwarranted corrections of plan targets. Targets can be met in their entirety if the production plan is based on accurate data on the enterprise's potential and if production volume is determined on the basis of normative capacity.

In our day, the state expends material, labor and financial resources on the technical retooling of existing enterprises and the effective return on these resources depends on the substantiated calculation of the growth of and complete utilization of the enterprises' production capacities.

Practice shows that a number of machine building enterprises have been successful in determining the normative production capacity of basic production shops and in stimulating these shops to adopt taut plans. This point is confirmed by many years of experience of the Novokramatorskiy Machine Building Plant im. V. I. Lenin, the Sumskiy Machine Building Association im. M. V. Frunze, and others.

The calculation of normative production capacity (M_n) is based on: differentiated norms governing the shift coefficient of operation of various groups of equipment, including two-shift operation for basic production equipment, and for auxiliary equipment--operation based on planned utilization; the nominal operating time of this equipment; the scheduled machine tool inventory [spisochnyy sostav]; the coefficient of fulfillment of the output norm; and the plan target for increasing labor productivity by lowering the labor-output ratio. The calculation

is based on the following formula:

$$M_n = E(N K_{n, \text{norm.}}, \Phi_{n, \text{norm.}}, K) + C_{T, n},$$

where N is the scheduled machine tool inventory in the various equipment groups (in units); $K_{n, \text{norm.}}$ is the normative shift coefficient for the operation of each group of machine tools; $\Phi_{n, \text{norm.}}$ is nominal annual operating time per machine tool per shift (in hours); K is the normative coefficient of progressive fulfillment of output norms by operators of machine tools in a given group; and $C_{T, n}$ is the target of reducing the labor-output ratio.

The novelty of the method used to calculate normative capacity consists, first of all, in the use of normative initial data, including the shift coefficient of operation of various groups of equipment, which practically excludes existing discrepancies in the methods used to determine capacity and shift coefficient. Another new feature of this method is that it takes the growth of labor productivity into account in the measurement of normative labor-output ratios. The given method harmoniously combines the Dinamo method under which workers and brigades adopt their own annual plans for the growth of output volume and labor productivity with the production capacity of subdivisions and the enterprise as a whole. Moreover, production capacity computed in standard machine-hours characterizes the capacity of the entire complex of production equipment to perform a normed volume of work in a given unit of time. Capacity is thereby freed from being directly dependent on the product mix and is hence considered independently prior to the formulation of the production plan.

The calculated substantiation of normative production capacity precludes the juggling of data on capacity to fit the adopted production target. To the contrary, a calculated relationship is secured between the major indicators: production capacity, growth of labor productivity, and the production target. For recordkeeping, for monitoring the utilization of the normative capacity of enterprises, this relationship must be expressed in value and physical terms. This is realized through the use of an accounting norm regarding the volume of production, i. e., commodity output or normative net output per standard machine-hour of machine (working) time or the expenditure of machine time per unit of output in physical terms. These calculations are based on estimates of the cost of maintaining and operating equipment. Output is measured with the aid of estimated rates of machine operation per hour. Thus if the volume of output in the ex post year was 50 million rubles and 3250 thousand standard machine-hours were expended on this output, the commodity output per standard machine-hour was 16.9 rubles.

Thus if normative production capacity in the ex ante period is determined to be 3700 thousand standard machine-hours, it will correspond to 62.53 million rubles of commodity output. The relationship between capacity and normative net output is determined in similar fashion.

Normative substantiation of production capacities makes it possible to increase the tautness and practicability of 5-year and 1-year plans, to detect and utilize reserves of new technology, equipment, organization and management of production in associations and at enterprises on the basis of economic and engineering calculations and to prevent the establishment of plan targets solely on the basis of the existing dynamics of the corresponding indicators.

A significant influence on the elaboration of taut plans is exerted by the fundamentally new approach to the evaluation of the fulfillment of the 5-year plans of associations and enterprises on a cumulative basis starting with the beginning of the 5-year plan and 1-year plans starting with the beginning of the year.

Scientific and technical progress radically alters the character of technical retooling of existing enterprises and thereby the methodology used in planning the development of capacities and production. The fixed productive capital of enterprises is renovated (1) gradually through the sequential accumulation of partial improvements, through the replacement of individual worn-out or obsolescent machines and (2) through the one-time comprehensive retooling of production or the reconstruction of the enterprise which qualitatively change the structure of fixed capital and the production potential of the enterprise.

In the past, the cumulative form of partial improvements in fixed capital was dominant. Enterprises devised plans of organizational-technical measures to eliminate bottlenecks hindering the realization of short-range targets. The volume of this work was limited to the size of the production development fund--roughly 5-7 percent of the average annual value of the production apparatus.

The partial improvement of equipment and technology could not exert a significant influence on the structure of fixed capital and on the technical level of production. It determined the uniform character of growth of the production capacities of enterprises, which was also taken into account in the existing methodology of long-range planning of the development of production. Annual targets in 5-year plans were usually calculated according to average annual growth rates proceeding from the levels of production volume attained in the base year and specified by the plan for the final year of the 5-year plan.

Present technical policy envisages the acceleration of the tempo of the scientific and technological revolution, the renunciation of the old practice of putting individual machines into operation, of the partial improvement of production processes, and the transition to the widespread use of highly effective systems of machinery and equipment, the integrated mechanization and automation of all production processes, and the reconstruction of existing enterprises. Such an integrated approach to the renovation of fixed capital qualitatively alters the enterprise's production capacity. Following such cardinal technological change, there will probably be a period of relative stabilization of the technical level of production accompanied by improvements in individual elements of the production process.

The change in the stages of renovation of equipment and technology causes the uneven development of production which should be taken into account in the methodology of long-range planning. Adherence to the uniform planning of the development of production at enterprises on the basis of average annual growth rates notwithstanding the uneven character of change in the material-technical base creates the possibility of restraining the adoption of higher indicators and thus of reducing the tautness of annual plan targets. This trend was associated with the deeply-rooted past practice of planning the growth of technico-economic indicators in 5-year plans on the basis of the status quo and the continuity of annual growth rates. Enterprises that attained specified production growth rates in the ex post period were assigned the same or higher growth rates for the subsequent period. The lowering of these rates, particularly in the

socialist competition, was viewed as the loss of initiative in detecting and using production reserves. Such a planning practice naturally evoked the concern of enterprise managers regarding the future economic well-being of the enterprise. After all, enterprises that mobilized their production reserves to the maximum in certain years of a 5-year plan period were not always able to sustain the same rate of development in subsequent time. This circumstance forced them to keep production capacities in reserve, to slow down the realization of their production potential in the first years (of the plan period) by distributing (prolonging) their effective return over a longer period of time.

At the same time, even if we admit a certain degree of unevenness in the planning of the development of the enterprise's production (which is characteristic when technical complexes are put into operation) even if the target remains the same at the end of the 5-year plan, it will be found that for the 5-year period as a whole there will be a substantial increase in the volume of commodity output compared with the sum of annual indicators calculated on the basis of average annual growth rates.

Under the conditions of two- or three-link structures of production management and the organization of production and science-production associations in addition to all-union industrial associations (VPO), an important role in the adoption of taut plans is assigned to the differentiation of management functions and methods characteristic of these links alone.

The excessive centralization of functions results in petty wardship and becomes a hindrance to the development of the initiative of production associations (enterprises). For example, such a key function as specialization and cooperation at various levels of management must basically differ by virtue of their content and direction. Thus, all-union industrial associations must work out the direction of subject specialization for each production association and enterprises and prevent their use to produce products outside their area of specialization. It is now possible to achieve a higher degree of subject specialization on the basis of the broader use of the building-block and modular principle in product design. Thus even in the design stage it is possible to determine the participation of each production link within the framework of integrated production of the final product.

Production associations in turn must develop the technological specialization of component production facilities, which ultimately creates real prerequisites for the effective and maximum utilization of perfected technical complexes and technological systems. Unfortunately, such differentiation of function does not yet exist.

The leading final indicators now include the evaluation of the level of satisfaction of demand--the fulfillment of economic contracts. Possibly, this direction is specifically the truest in the formulation of production assignments and in the evaluation of their tautness.

The national economy is not merely the sum of isolated enterprises but is also their aggregate. This circumstance generates complex technical relations and economic relations between them. Each enterprise must search for ways and means of meeting mandatory targets and for expanding the sphere of consumption of its product. This becomes the task of both the centralized plan and of the plans of enterprises just as soon as they form portfolios of orders and bear responsibility for the fulfillment of obligations.

it is essential to raise the role of customer enterprises in the formulation of production plans, to make widespread use of a system of orders and economic contracts, to improve economic relations between enterprises producing finished goods and enterprises and organizations that supply raw materials, supplies and components in the interests of obtaining the maximum national economic effect.

Existing manufacturing enterprises are usually quite well informed on the future prospects of their customers. They know that they will inevitably lose some of these customers in time owing to their conversion to a new type of product at the same time that they will gain new customers for the same reason. Direct and especially long-term economic relations make it possible to foresee such changes. There is a considerable degree of inertia in the system of long-term relations. Therefore, it very rarely happens that demand for a product will change entirely without warning. Most frequently it will be accompanied by the simultaneous gradual decline in the consumption and production of one product and the increase in the production of another. Such changes are recorded in the delivery terms and are easily monitored by enterprises.

Thus the reference is to the organization of rational relations of enterprises under new conditions of planning and management, which ensures the more complete and effective utilization of production capacities. The state constantly strives to increase the activism of enterprise collectives in the search for most effective management techniques and in the effort to attain not only internal production results but national economic results as well. Such is the orientation of the system of economic incentives. Under the 11th 5-Year Plan, ministries are given the right to include among capital-forming indicators evaluations of the tautness of plan targets of associations (enterprises).

The new procedure for paying a percentage of calculated profit into the incentive funds has given enterprises greater motivation to overfulfill the profit plan. Thus profit now plays a greater part in the cost accounting mechanism of enterprise management.

It is known that calculated profit increases as a result of the growth of production, the lowering of the enterprise cost of production, and the reduction of payments for capital, fixed payments, and bank credits.

The increase in the volume of production depends directly on the development and use of production capacities and on the increase in labor productivity, which also actively influences the increase in the enterprise's potential and the more effective utilization of the production apparatus. In turn, the lowering of the enterprise cost of production is achieved both through the reduction of direct expenditures per unit of output and through the distribution of relatively stable (conditionally stable) expenditures for a larger volume of output.

What is more, with an increase in the tautness of the plan, i. e., in the volume of production vis-a-vis capacity and hence vis-a-vis the value of fixed capital, the share of transferred value (amortization deductions) in every ruble of commodity output declines.

And, finally, payments for capital also depend to a considerable degree on the tautness of the plan, on the level of utilization of production capacities. If an enterprise reduces surplus equipment to the minimum and has a high return on its capital, payments for capital will be reduced relative to the increased output.

All these directions of increasing the effectiveness of production are concentrated in the calculated profit growth indicator.

The interest of enterprises in higher profits also affects such problems as the pricing of new, highly effective products. It can hardly be considered correct to establish prices on new products on the basis of profitability lower than that attained in old analogues. Many years of experience and discussion of this problem confirm the existence of shortcomings in the pricing mechanism and the need for the mechanism to take into account the interests of the manufacturer in preserving the existing level of profitability of production when new products are put into production.

In the mechanism for stimulating the effectiveness of production and for securing the more complete utilization of capacities, no small part is played by payments for capital. Existing practice has revealed the possibility for increasing the impact of this economic lever on raising the output-capital ratio especially at the time of activation of new production capacities. The broad differentiation of long-term normative payments for capital become a decisive factor in our opinion.

The overall payment for capital must be formed from the sum of partial, differentiated norms for the state and utilization of capacities, for the level of technology and other indicators. Higher norms governing payments for capital must be applied to enterprises that operate obsolete equipment, that have an insufficiently developed production potential, and that realize a low return on their capital. Technically backward enterprises must not enjoy equal conditions on a par with leading enterprises in the formation of calculated profit and hence in the formation of economic incentive funds.

We consider it expedient and timely to elaborate branch scales of the differentiated norm governing payments for capital on the basis of the most important features of their progressiveness and effective utilization. Such scales can be presented in the form of the following table.

Indicator of progressiveness of capital and level of its utilization	Evaluation of normative level	Normative payments for capital	Correction Factors	
			For increase (-) by an order of magnitude	For decrease (+) by an order of magnitude
Utilization of normative production capacity	Under 0.6	1.7	0.10	0.2
	0.6-0.65	1.6	0.15	0.3
	0.65-0.9	1.4	0.20	0.4
	0.90-0.95	1.2	0.25	0.5
	0.95 and higher	1.0	0.30	0.6
Level of equipment and technology	Under 0.6	1.5	0.05	0.1
	0.6-0.7	1.0	0.10	0.2
	0.7-0.8	0.7	0.15	0.3
	0.8-0.9	0.5	0.20	0.4

Equipment shift coefficient	Under 1.3	5.0	0.20	0.4
	1.3-1.4	4.0	0.25	0.5
	1.4-1.5	3.0	0.30	0.6
	1.5-1.6	2.5	0.35	0.7
	1.7-1.8	2.0	0.40	0.8
Reproduction coefficient	1.0 or higher	1.5	0.50	1.0
	Under 0.04	1.6	0.10	0.2
	0.04-0.05	1.0	0.15	0.3
	0.05-0.06	0.5	0.20	0.4
	etc.			

Let us assume that an enterprise's capacity utilization coefficient was 0.8, that it was an order of magnitude lower than in the preceding year, that the level of equipment and technology remained at the same level (0.65), that the shift coefficient declined by an order of magnitude and comprised 1.45, and that the reproduction coefficient rose by an order of magnitude and comprised 0.04. Then the summary normative payment for capital according to the scale will be determined as 7.8%:

$$\Pi_s = (1.6 + 0.2) + 1.0 + (3.0 + 0.6) + (1.5 - 0.1) = 7.8.$$

The enumerated directions of improvement of the economic mechanism, in particular, planning will promote the acceleration of the renovation of products, the reduction of the activation time of production capacities, the raising of the level of specialization, mechanization and automation of production processes, and the adoption of more intensive plan targets by the enterprises.

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METALWORKING EQUIPMENT

SPECIALIZATION IN MACHINEBUILDING

Moscow PLANOVYE KHOZYAYSTVO in Russian No 6, Jun 81 (signed to press 7 May 81)
pp 105-109

[Article by M. Gazaliyev, head of laboratory, Council for the Study of Productive Forces under USSR Gosplan].

[Text] The USSR has a powerful multibranch machine building industry that numbers thousands of large, well equipped enterprises and production associations and hundreds of scientific research and technology institutes and design offices. Our machine building industry occupies second place in the world in the production of diesel locomotives, electric locomotives, metalcutting machine tools, agricultural machinery, tractors (in terms of summary engine capacity) and leads the world in the production of other types of very important equipment.

In recent years, the machine building industry has developed at a relatively more rapid rate compared with industry as a whole.

At the same time, the state of some machine building branches still does not entirely meet modern demands and tasks. The capacities that produce a number of machines and pieces of equipment are insufficient for the total satisfaction of the requirements of the national economy. The technical level of some types of machines and instruments frequently lags behind the world's best.

The Basic Directions of Economic and Social Development of the USSR in 1981-1985 and in the Period up to 1990 call for the early full-scale development and production of new types of machinery, equipment, means of automation and instruments that permit the broad use of highly productive energy- and material-saving production processes in all branches of the national economy and for the production of the necessary equipment that corresponds to the specific operating conditions in various regions of the country. There will be an increase in the production of systems of machines and equipment and especially of automatic program-controlled manipulators that make it possible to exclude the use of manual labor in arduous, monotonous jobs.

The solution of problems confronting the machine building industry depends to a considerable degree on the level of its specialization. The broad development of the specialization of production is a most important direction in intensifying production and increasing the effectiveness of production. Calculations show that

over one-third of the increase in labor productivity in the machine building industry can be achieved through the specialization of production. At the same time the growth of labor productivity due to specialization requires 1.5-2 times fewer expenditures than the same increase in productivity due to other factors.

In recent years, the machine building branches have made a great effort to develop the specialization of production. In particular, measures have been taken to concentrate the production of homogeneous products and to organize the specialized production of blanks, truck and tractor engines, metal fasteners, gears, hydraulic equipment and other branch and interbranch products. Production associations realize the highest level of specialization. This is attested to by the experience of such associations as AvtoZIL, AvtoVAZ, Elektrosila, LOMO and others.

The main task in creation of production associations is not merely to secure the merger of a group of independent enterprises. The merger must result in the formation of a unified production complex, all component elements of which are interconnected by the division of labor and by the specialization of each of them. Analysis shows that the simple merger of 3-5 enterprises usually increases labor productivity by 15-30 percent and that the concentration of production coupled with specialization in depth doubles and trebles productivity. The Basic Directions state: "Improve organizational structures according to plan and increase the effectiveness of the work of production and industrial associations on the basis of further specialization, concentration and cooperation."

However, notwithstanding work that has been carried out in machine building as a whole, there has as yet been no radical improvement in the development of specialization and especially its most effective directions--detail and technological specialization, the level of specialization in the branch remains low. The Basic Directions state: "Continue the further specialization of machine building production in depth and breadth, the creation of new and development of existing specialized enterprises and large shops that fabricate blanks, parts, assemblies and units for branch and interbranch use."

Owing to the absence of clearly defined branch, intrabranch and interbranch specialization the production of similar types of products is deconcentrated among various machine building branches. The level of detail and technological specialization is low. In particular, sufficient specialized capacities do not exist for the centralized production of blanks, parts, assemblies and units intended for mass branch and interbranch use.

The machine building branches call upon other branches' enterprises, which outnumber machine building enterprises severalfold, to manufacture products that comprise a small part of the production volume of a given branch. For example, 83 percent of the manufacture of construction, road and municipal machine building equipment is concentrated at 150 enterprises belonging to the Ministry of Construction, Road and Municipal Machine Building while the other 17 percent are manufactured at more than 350 plants in other branches. Approximately 400 enterprises belonging to 35 ministries and departments manufacture hoist-transport

*KOMMUNIST, No 1, 1978, p 76.

equipment. Centrifugal pumps are produced at enterprises belonging to 30 ministries, metalcutting equipment is produced at enterprises belonging to 20 ministries, and equipment for the food industry is manufactured at enterprises belonging to 10 ministries. Children's bicycles are produced by 39 plants belonging to 10 ministries. Forty models of washing machines are produced by 33 plants belonging to different ministries and departments.

Detail and technological specialization is relatively developed only in the auto and tractor building industries, where its level is 25-32 percent of the production. In other machine building branches, these forms of specialization have not been sufficiently developed: detail specialized enterprises account for 1.5-7.8 percent of total commodity output while technologically specialized enterprises account for 0.1-3.0 percent. The share of centralized production of castings for a number of years has not exceeded 4.5 percent, while the share of welded metal components has been 1 percent of total output. The given indicators are considerably higher in the industrially developed countries.

The principal factor impeding the growth of the specialization of production is that the machine building industry develops primarily on the basis of enterprises with an integrated structure and with a closed production cycle (which includes basic, setup, toolmaking, repair, and other auxiliary and service facilities). Such an enterprise structure does not conform to the rational organization of production. Nonetheless, some ministries continue to build new plants and reconstruct existing plants on the basis of a closed production cycle. This situation is explained by the departmental approach to the development of the specialization of production.

The low level of specialization at many enterprises limits the possibility of making effective use of equipment and of using mass production technology and of using the production apparatus more completely and rationally. Calculations show that the higher prime cost of products produced by unspecialized machine building plants (blanks, parts and assemblies for general use, and tools) alone costs the national economy an annual loss of approximately 2 billion rubles. According to the data of branch institutes, the annual saving from the development of detail and technological specialization in the electrical equipment industry, in instrument making, in agricultural, light and food machine building will exceed 2.5 billion rubles. The higher level of specialization of production in machine building may mean a saving of many billions of rubles.

The development of machine building branches is associated with the changeover to assembly-type enterprises (based on specialized plants) that possess optimal capacities for the fabrication of parts, assemblies, units and blanks for branch and interbranch use. Following this direction of development of production specialization, we must resolve the question of creating new enterprises and rebuilding and expanding existing enterprises with an integrated product mix. The possibility of building new integrated enterprises must be excluded.

The changeover to highly organized specialized production in machine building presupposes changes in the structure of the branch and individual enterprises and in R&D practices. Planning practice must concentrate attention

on the development of the specialization of production in the following basic directions: interbranch; international (within the CEMA); and the specialization of research and design work.

In accordance with these directions, all machine building branches should carry out subject, detail and technological specialization in greater depth. Subject specialization in the construction of machine tools, for example, will develop on the basis of new series of machine tools, forging-pressing, casting, and wood processing machinery, and other products. In the tractor and agricultural machine building industry, subject specialization should be based on the concentration of machines and equipment designed for similar agrotechnical use and on the technological homogeneity of the given products.

In the mining and coal machine building industry, where the product mix numbers more than 200 standard sizes [tiporazmery], the basic direction of specialization is to concentrate the production of products of similar types. In particular, there is a need to concentrate the production of cutting and tunneling machines, powered supports, flight and belt conveyers, mine cars, drilling rigs, ore dressing equipment and other machines and mechanisms at separate plants.

The broad development of detail and technological specialization is the most important direction in raising the level of specialization of production. This is confirmed by the practice of many industrially developed countries. Head [golovnyye] enterprises should be relieved of the obligation of producing numerous blanks, parts and assemblies intended for mass use and these items should be centrally produced instead. It is specifically the concentration and centralization of production of similar units, assemblies, parts and blanks that make their mass production possible and that create conditions most highly favorable to the introduction of highly productive technology and progressive production processes.

CEMA member nations are increasingly organizing the production of many types of products on the basis of detail specialization. Specialists estimate that the machine building industry of socialist countries may reap vast benefits from the concentration of the production of assemblies and parts on the basis of international cooperation. The degree of automation will be increased from 10 to 50 or more percent while the batch production [seriynost'] of assemblies will increase 4-6 fold and of parts --6-10 fold. As a result, the overall productivity of labor will increase 3-5 fold while the enterprise cost of production will be reduced by 30-50 percent.*

In USSR machine building, the specialization of the production of blanks, standardized parts, assemblies and units will in the future undergo development both in existing branches and in the branch of industry that produces general machine building products. Much attention must be devoted to the specialization of standardized parts, assemblies and units intended for branch use. In the machine tool and tool building industry, for example, the share of centrally fabricated parts, assemblies and units in overall commodity output may be as high as 25-30 percent. This will promote a considerable rise in effectiveness and in the volume of production at existing enterprises. Thus, institutes estimate that the creation

*KOMMUNIST, No 15, 1978, p 95.

of a specialized plant and the release of nine Moscow machine tool plants from the obligation to fabricate various parts and assemblies will enable these plants to increase their production of program-controlled machine tools to 8500 compared with 700; automated and semiautomated machine tools--to 450 compared with 150; and specialized machine tools--to 4400 compared with 2600.

Design institutes estimate that on the basis of the development of standardization, the automotive industry and the tractor and agricultural machine building industry should organize the specialized production of more than 200 groups of parts, assemblies and units that are produced for mass use. Particular attention should be devoted to the specialization of the production of engines. The requirement for engines must be entirely satisfied by centralized production which offers enormous potential for large-scale specialized production--the basis for the broadest application of highly productive equipment and progressive technology.

The centralized production of parts and assemblies for general use in machine building will become highly developed. According to the calculations of design institutes, the problems will be solved when machine building branches create 200-300 specialized enterprises for the production of general machine building products (all types of blanks, standardized general machine building parts and assemblies). The degree of satisfaction of machine building's requirements for the given products by centralized production can be increased to 70-80 percent (and to 100 percent for certain types of products). It appears expedient to establish independent subbranches of machine building for the production of such general machine building products as engines, reduction gears, hydraulic equipment, powered supports, pinions, etc., similar to the system that exists in the bearing industry.

The most important technological prerequisites to the broad development of specialization--especially detail and technological specialization--are the standardization, normalization, unification and unitizing of products and their components. The Basic Directions point to the need to "secure the in-depth intrabranch and interbranch unification of parts, assemblies and technological processes." Specialization in combination with the unification and normalization of blanks, parts, assemblies and finished products permits the most rational organization of production and vastly more effective production.

Machine building branches have major opportunity for increasing the depth and breadth of intrabranch and interbranch specialization on the basis of the standardization and unification of pieces, assemblies and parts and the type-design of production processes. Let us take the production of gears as an example. At the present time, we are producing them in more than 60,000 standard sizes. Experts estimate that this number can be reduced more than 20 fold. This would make it possible to concentrate the nation's gear production at a limited number of specialized plants whereas they are at the present time produced by almost every machine building plant. Over 400 of the nation's enterprises are engaged in the manufacture of hydraulic drives even though it would be expedient to concentrate their production at 30-35 specialized plants. Twenty-one models of vacuum cleaners are produced at 13 enterprises belonging to 5 different ministries. The share of unified vacuum cleaner parts is no more than 25 percent whereas the GOST (all-union state standard) calls for the level of unification [unifikatsiya] to be at least 80 percent.

Battery-powered and power lift trucks (which are in short supply) are produced by enterprises belonging to different ministries. Their production could be substantially increased through broader specialization and interbranch cooperation. The appropriate conditions are at hand since these lift trucks are similar in most respects. They have similar front and rear axles, steering mechanisms, braking systems, hydraulic drives, hoist mechanisms, etc. Research shows that roughly 70-80 percent of the components used in these trucks could be standardized. This would greatly facilitate their mass production, the reduction of the mix, the reduction of the cost of their production, and the better organization of their repair and maintenance. An essentially similar situation is seen in the case of many parts, assemblies and units intended for branch and general machine building use.

The development of specialization of production is greatly influenced by the raising of the level of specialization of R&D work. R&D specialization should be realized through the concentration of the effort of R&D collectives on narrow areas. Such measures are being carried out in some machine building branches. Thus the tractor and agricultural machine building industry has established 38 design organizations, each of which specializes in the development of a certain complex of agricultural machines. The procedure governing their design has been established and responsibility has been assigned for the quality of R&D and for production. All this makes it possible to develop a system of machines on the basis of a prototype.

The unification and standardization of parts, assemblies and modules of machinery and equipment create conditions necessary for reducing the cost of their production, operation and maintenance. It is essential to prevent the duplication and decentralization of the R&D effort in various branches and to proceed to their concentration in the leading branches. The USSR State Committee for Standards must play a greater part in unification and unitizing efforts in the machine building branches.

The immediate implementation of an integrated program of measures of a scientific-technical, economic and organizational character would accelerate the development and raise the level of specialization of machine building production. First of all, branch research and design organizations must classify machines, equipment, instruments, assemblies, parts and blanks into homogeneous groups, the production of which must be concentrated at different enterprises; must determine the optimal (expedient) volume of specialized production (in enterprises, shops, divisions); and must plan the branch and interbranch standardization, normalization and unification of parts, assemblies and units of unitypical machines and equipment. This work must be stipulated in the plans of appropriate institutes for various machine building branches.

In accordance with the decree of the CPSU Central Committee and the USSR Council of Ministers "On Improving Planning and Strengthening the Influence of the Economic Mechanism on Increasing the Effectiveness of Production and Improving Work Quality," particular attention must be focused on strengthening the role and significance of the sections of long-term and short-term national economic, branch and territorial plans that pertain to the specialization of machine building. Without this, it would be impossible to develop the specialization of production at an accelerated rate. Sections on the specialization of production are contained in

guidelines, forms and indicators used in drafting national economic plans. Machine building branches submit materials based on these forms and indicators. However these materials are not properly analyzed, coordinated and summarized and are not reflected in the national economic plans.

Plans for the nation's economic and social development should contain targets regarding the attainment of rational levels of branch and interbranch specialization of production. The reference is first and foremost to the target of concentrating the production of individual types of products in various branches and at various enterprises and to the target of attaining progressive, economically feasible levels of development of detail and technological specialization. Progressive levels of specialization and centralization of production of parts, assemblies and blanks for branch and interbranch use must be developed by scientific research institutes with due regard to the experience of the industrially developed countries.

The development of special integrated programs for the specialization of associations and enterprises in branches and the more intensive division of labor within the framework of territorial machine building complexes and assemblies will be of great significance for raising the level of specialization of production. S. A. Kheyman's proposal on the development of master plans for the specialization of production merits approval. The author writes: "It seems to us extremely important master plans of the specialization and development of each major territorial machine building center be developed in the immediate future under the direction of republic and oblast gosplans and with the participation of ministries and that they be confirmed centrally together with the plan for their subsequent implementation."* Such master plans, which are pre-planning documents, are the basis of the sections of national economic plans that deal with the specialization of production.

The press has repeatedly raised the question of the need to form a branch for producing general machine building products. In our view, such a branch should have its administrative organs in major regions of the nation. This will promote the correct solution of problems in the concentration and centralization of the regional production of general machine building products and in the elimination of irrational interregional cooperative deliveries generated by departmental barriers.

At the present time, there is much irrational shipping between enterprises. For example, the Minsk "Udarnik" Plant belonging to the Ministry of Construction, Road and Machine Building receives steel castings from the Tashkent Excavator Plant while the Minsk Tractor Plant supplies castings to its brother plant in Tashkent. The same "Udarnik" plant receives hot rolled die forgings from the Bryansk "Dormash" plant even though it could obtain them in Minsk from the Minsk Auto Plant which delivers such forgings to the Bryansk Auto Plant.^{**}

In our view, the expansion of scientific research on the economic problems associated with the development of specialization and cooperation under the conditions of improvement of the management of production, its planning and economic stimulation would promote the creation of the necessary prerequisites for the accelerated

*PLANOVYE KHOZYAYSTVO, No 2, 1978, p 110.

**See KOMMUNIST, No 9, 1978, p 116.

development of the specialization of production. It is also important to keep statistics on the basic indicators that characterize the state of specialization in its principal directions in machine building branches and regions.

The specialization of industrial production is closely associated with the territorial division of labor. The creation of specialized production facilities in a region based on the use of its natural, raw material and labor resources determines the specialization of an individual economic region. The branch ("vertical") and territorial "horizontal" division of labor and the specialization of production are directly associated with the location of the productive forces.

The Basic Directions emphasize the need to site the productive forces on the basis of the further specialization and proportional development of the economy of the union republics and economic regions as a part of the unified national economic complex. The development of existing and the formation of new branch and interbranch complexes and assemblies are the principal forms of territorial organization of production in machine building. It is preferable that machine building complexes and associations consist of head [golovnyye] plants that manufacture the basic mechanisms and assemble the machines and of a broad network of specialized enterprises that fabricate individual assemblies, parts and blanks. These complexes must incorporate a design office, experimental shops and plants, informational and research laboratories. The task of creating complexes should be considered in the siting of machine building enterprises.

In the formation of complexes and associations, special attention must be devoted to the construction of well-equipped medium and small-size detail- and technologically-specialized affiliates that supply individual machinery and equipment parts to head enterprises. The siting of such affiliates in small towns and workers' settlements would facilitate the solution of the problem of their social and economic development and the problem of the rational utilization of regional manpower. A great deal of positive experience in this regard has been amassed by the "Armelektrosvet" production association which has eight affiliates in small towns in the Armenian SSR.*

It would seem that the implementation of the recommended measures would have a great impact on the broad development of specialization in machine building--a key factor in increasing the effectiveness of production.

*See: PRAVDA, September 26, 1980.

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METALWORKING EQUIPMENT

AUTOMATING MACHINE TOOLS DISCUSSED

Minsk PROMYSHLENOST' BELORUSSII in Russian No 3, Mar 81 (signed to press 18 Feb 81) pp 43-45

[Article: How To Plan Automating Work on Tool Sets With ChPU (digital program control)?]

[Text] Working out the function of operational calendar planning is an important question in setting up a system for control of production. Planning the operation of automated groups of machine tools with ChPU (digital program control) has particular importance, since it is directly related to increasing their work load and raising labor productivity. Unfortunately this function, especially with respect to the section for machining heavy parts weighing up to 10 tons when production is done in small series, has not been sufficiently worked out so far. We would accordingly like to tell about the experience in working out a system for managing a section of that kind at the Ul'yanovsk Plant for Heavy-Duty and Special-Purpose Machine Tools.

What is new in this development is the use of elements of the target-program method of planning and also the creation of alternative draft plans consisting of separate program modules whose number can be altered; this diversifies the problems that can be solved for differing specific production conditions, differing configurations of management systems and differing types of computers used. The modules can be used for circulation in packages of applied programs.

Building the model of the planning function begins with the drafting of the monthly plan. If the section operates within an integrated system, the plan is designed for the large computer and is read into the small computer on perforated tape. If the section is operating locally, then the monthly plan is designed for the large computer and punched into the small computer. In both cases the plan of the next month is combined with the remainder of the plan for the previous month. A summary monthly plan is thereby shaped. Its typical feature is that the parts remaining from the plan of the previous month have a high start priority. This is to maintain the continuous load on the machine tools.

But even though the start and completion of lots of parts are calculated in the monthly plan by operations for each machine tool, this is an approximate computation because of the long planning interval and only outlines the section's

program of operation for the month. There is a need, then, for more precise planning that would take into account achievement of partial goal in the interests of the main goal--fulfillment of the monthly plan. This more detailed planning consists of calculating the intermediate schedule-plan for the operation of the section, for preparation of tools, attachments and workpieces, and shift-and-day planning of the section's operation and the issuance of attachments and tools.

We will examine these types of planning in more detail.

One of the conditions for smooth operation of automated production is its prompt and complete preparation. After all, if automated production is not prepared at just one position, it will become impossible to shape the shift-day plan, to load machine tools, and so on. The result is idle machines. In our view, then, in preparing production one needs to use intermediate planning covering an interval between 2 and 10 days depending on the conditions of production and in devising this plan to take into account the factors that help in revealing its content.

First factor--the initial information for shaping the intermediate plan, which above all may be the plan for the section's operation during the month. But aside from planned orders, extraordinary orders may also be submitted for machining. Then the question arises: When to start their machining: as they occur, or should they be included in the intermediate plan? Some people say: as they arrive. But there is a "but" involved here.

We know, for example, that machining on ordinary machine tools is a discrete process. When a discrete process is automated, it becomes a continuous discrete process which must be maintained by virtue of adequate supply to the section of workpieces, tools, control programs and attachments. This is precisely the purpose of intermediate planning.

Let us suppose that the chief of the shop has issued the rush assignment of machining extraordinary orders for which production has not been prepared in advance. The system for control of the section need not and cannot honor that subjective demand. The extraordinary order must be included in the intermediate plan for preparation of production like any other order. This achieves not only continuity and smoothness in production, a uniform load on machine tools and higher labor productivity, but also a qualitative improvement of the attitude toward control of production. That is why we feel that information on extraordinary orders is also initial data for intermediate planning.

Second factor. Can intermediate planning be done if it is dovetailed only to the monthly plan and extraordinary orders? It turns out that it cannot because the automated section is operating in the context of the shop and the plant, which also advance their restrictions. The content of the basic restrictions comes down to the following: parts are machined in the section in lots, they move through successive stages in the flow chart, the lot must be machined without interruption, and so on.

Third factor. Because each lot has its starting date, and the machine tools are intended for machining parts by operations, the machining of parts is started in order according to the priorities which are determined by checking the condition of the lots with respect to the established rules of preference. That lot which is already being machined has the highest priority. This is understandable: To remove a part from a machine tool and to install another one means breaking the continuity of production and lowers labor productivity. If the rhythm has to be disrupted and extraordinary orders interposed, this situation has the next priority. We have discussed above what that means.

Those lots whose machining has not begun are next to be considered. A very important question here is which of them should be machined first: those with the maximum production cycle or those with the minimum production cycle? Our research has shown that it should be those with the maximum production cycle, since this increases the chances of machining the lot on time and fulfilling the monthly plan.

Finally, if a conflict situation arises, then the first part as entered is selected for machining from the format of the monthly plan.

The next step is to calculate the available machine tool operating time for each shift of the first day and for each succeeding day. These amounts of available time are necessary for maximum and uniform work load on the machine tools. Use of information on preventive maintenance, idle time caused by breakdowns and days off is typical of the calculation of available time.

But to fully realize the purpose of intermediate planning one must achieve a series of partial goals which consists of intermediate planning of the preparation of tools, workpieces and attachments.

The typical feature of preparing tools is that it is planned in sets for the lot of parts on the basis of data on the order of priority for the start of machining of the parts and the data of the intermediate schedule-plan for operation of the section.

There are several points of view concerning planning of the delivery of work-pieces over the intermediate period. One of them is that workpieces should be delivered to the warehouse of the section to cover the volume of the monthly plan and then delivered for machining. But a large and expensive warehouse is required to store a month's work consisting of large-size workpieces. We therefore came to the conclusion that preparation of large-size workpieces needs to be planned over the intermediate period and they need to be delivered from supplier shops to the warehouse of the section on a continuous rather than discontinuous basis. This means that the section does not have to have a warehouse to store the entire month's large-size workpieces, and consequently costs are reduced.

One of the bottlenecks in preparing production is intermediate planning of the preparation of attachments. It is a bottleneck because the attachments, which are complicated and expensive articles, consist of various elements of jigs,

tools and fixtures that are assembled from general-purpose components depending on the purpose of the parts; on the one hand these jigs, tools and fixtures are available in limited numbers, and on the other they are frequently used simultaneously in different attachments. In the first stage of setting up the system, then, this question is resolved by a human being rather than a computer.

Tabulations are printed up in accordance with the intermediate plans, and the relevant services use them to deliver to the storerooms of the section the planned workpieces, tools and attachments. As they arrive, the relevant accounting information is fed into the computer. The data built up on this basis help in guaranteeing a full work load on the machine tools consisting only of those parts for which the tools, attachments and workpieces have been prepared. This yields the schedule-plan for the sections operation for the day and shift. It can reflect the code of the part to be machined, the number and code number of the equipment in the section, and the start and finish time for machining the parts.

After the intermediate plan for preparation of production for the section and the plan of operation for the day and shift have been drawn up, the question has to be settled of delivering to machines the necessary tools, attachments and workpieces. The information of the shift-day plan is sufficient for the delivery of workpieces and attachments. As for delivery of tools, in this case a specific plan is drawn up on their delivery in sets with a double inventory, which is necessary for replacement of individual tools which break or wear out normally.

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